TABLE 1. Licensed vaccines and toxoids available in the United States, by type and recommended routes of administration

Vaccine	Type	Route
Adenovirus*	Live virus	Oral
Anthrax^	Inactivated bacteria	Subcutaneous
Bacillus of Calmette and Guerin (BCG)	Live bacteria	Intradermal/percutaneous
Cholera	Inactivated bacteria	Subcutaneous/intradermal§
DTP-Haemophilus influenzae type B conjugate (DTP-Hib)	Toxoids, inactivated whole bacteria, and bacterial polysaccharide conjugated to protein	Intramuscular
Diphtheria-tetanus-acellular pertussis (DTaP)	Toxoids and inactivated bacterial components	Intramuscular
Hepatitis B	Inactive viral antigen	Intramuscular
Haemophilus influenzae type B conjugate (Hib)¶	Bacterial polysaccharide conjugated to protein	Intramuscular
Influenza	Inactivated virus or viral components	Intramuscular
Japanese encephalitis	Inactivated virus	Subcutaneous
Measles	Live virus	Subcutaneous
Measles-mumps-rubella (MMR)	Live virus	Subcutaneous
Meningococcal	Bacterial polysaccharides of serotypes A/C/Y/W-135	Subcutaneous
Mumps	Live virus	Subcutaneous
Pertussis^	Inactivated whole bacteria	Intramuscular
Plague	Inactivated bacteria	Intramuscular
Pneumococcal	Bacterial polysaccharides of 23 pneumococcal types	Intramuscular/subcutaneous
	Conjugate of 7 serotypes	Intramuscular
Poliovirus vaccine, inactivated (EIPV)	Inactivated viruses of all 3 serotypes	Subcutaneous
Rabies	Inactivated virus	Intramuscular/intradermal**
Rubella	Live virus	Subcutaneous
Tetanus	Inactivated toxin (toxoid)	Intramuscular^^
Tetanus-diphtheria (Td or DT)§§	Inactivated toxins (toxoids)	Intramuscular^^
Typhoid (parenteral)	Inactivated bacteria	Subcutaneous¶¶
(Ty21a oral)	Live bacteria	Oral
Varicella	Live virus	Subcutaneous
Yellow fever	Live virus	Subcutaneous

*Available only to the U.S. Armed Forces.

^Distributed by the Division of Biologic Products, Michigan Department of Public Health.

§The intradermal dose is lower than the subcutaneous dose.

¶The recommended schedule for infants depends on the vaccine manufacturer; consult the package insert and ACIP recommendations for specific products.

The intradermal dose of rabies vaccine, human diploid cell (HDCV), is lower than the intramuscular dose and is used only for pre-exposure vaccination. **Rabies vaccine, adsorbed (RVA) should not be used intradermally.

^^Preparations with adjuvants should be administered intramuscularly.

§§Td-tetanus and diphtheria toxoids for use among persons ≥7 years of age. Td contains the same amount of tetanus toxoid as DTP, DTaP, or DT, but contains a smaller dose of diphtheria toxoid. DT=tetanus and diphtheria toxoids for use among children <7 years of age.

¶¶Booster doses may be administered intradermally unless vaccine that is acetone-killed and dried is used.

TABLE 2. Immune globulins and antitoxins* available in the United States, by type of antibodies and indications for use

Immunobiologic	Type	Indication(s)
Botulinum antitoxin	Specific equine antibodies	Treatment of botulism
Cytomegalovirus immune globulin, intravenous (CMV-IGIV)	Specific human antibodies	Prophylaxis for bone marrow and kidney transplant recipients
Diphtheria antitoxin		Treatment of respiratory diphtheria
Immune globulin (IG)	Specific equine antibodies	Hepatitis A pre- and post-exposure prophylaxis; measles post-exposure prophylaxis
	Pooled human antibodies	
Immune globulin, intravenous (IGIV)		Replacement therapy for antibody deficiency disorders; immune thrombocytopenic purpura (ITP); hypogammaglobulinemia in chronic lymphocytic leukemia; Kawasaki disease
	Pooled human antibodies	
Hepatitis B immune globulin (HBIG)	Specific human antibodies	Hepatitis B post-exposure prophylaxis
Rabies immune globulin^ (HRIG)	Specific human antibodies	Rabies post-exposure management of persons not previously immunized with rabies vaccine
Tetanus immune globulin (TIG)	Specific human antibodies	Tetanus treatment; post-exposure prophylaxis of persons not adequately immunized with tetanus toxoid
Vaccinia immune globulin (VIG)	Specific human antibodies	Treatment of eczema vaccinatum, vaccinia necrosum, and ocular vaccinia
Varicella zoster immune globulin (VZIG)	Specific human antibodies	Post-exposure prophylaxis of susceptible immunocompromised persons, certain susceptible pregnant women, and perinatally exposed newborn infants

*Immune globulin preparations and antitoxins are administered intramuscularly unless otherwise indicated.
^HRIG is administered around the wounds in addition to the intramuscular injection.

TABLE 3. Recommended Childhood Immunization Schedule, United States, July-December 2004 Approved by the Advisory Committee on Immunization Practices (ACIP), the American Academy of Pediatrics (AAP), and the American Academy of Family Physicians (AAFP).

Available at www.cdc.gov/nip/acip

Also available by contacting the Kansas Immunization Program.

TABLE 4. Guidelines for spacing the administration of live and killed antigens

Antigen combination	Recommended minimum interval between doses
≥ 2 Killed antigens	None. May be administered simultaneously or at any interval between doses.*
Killed and live antigens	None. May be administered simultaneously or at any interval between doses.^
≥ 2 Live antigens	4-week minimum interval if not administered simultaneously.§ However, oral polio vaccine can be administered at any time before, with, or after measles-mumps-rubella, if indicated.

*If possible, vaccines associated with local or systemic side effects (e.g., cholera, parenteral typhoid, and plague vaccines) should be administered on separate occasions to avoid accentuated reactions.
^Cholera vaccine with yellow fever vaccine is the exception. If time permits, these antigens should not be administered simultaneously, and at least 3 weeks should elapse between administration of yellow fever vaccine and cholera vaccine. If the vaccines must be administered simultaneously or within 3 weeks of each other, the antibody response may not be optimal
§If oral live typhoid vaccine is indicated (e.g., for international travel undertaken on short notice), it can be administered before, simultaneously with, or after OPV.

TABLE 5. Guidelines for spacing administration of immune globulin preparations* & vaccines

SIMULTANEOUS ADMINISTRATION

Immunobiologic combination	Recommended minimum interval between doses
Immune globulin & killed antigen	None. May be given simultaneously at different sites or at any time between doses.
Immune globulin & live antigen	Should generally not be administered simultaneously.^ If simultaneous administration of measles-mumps-rubella [MMR], measles-rubella, and monovalent measles vaccine is unavoidable, administer at different sites and revaccinate or test for seroconversion after the recommended interval.

NON-SIMULTANEOUS ADMINISTRATION

Immunobiologic administered		Recommended minimum interval between doses
First	Second	
Immune globulin	Killed antigen	None
Killed antigen	Immune globulin	None
Immune globulin	Live antigen	Dose related^§
Live antigen	Immune globulin	2 weeks

*Blood products containing large amounts of immune globulin (such as serum immune globulin, specific immune globulins [e.g., TIG and HBIG], intravenous immune globulin [IGIV], whoe blood, packed red cells, plasma, and platelet products).
^Oral polio virus, yellow fever, and oral typhoid (Ty21a) vaccines are exceptions to these recommendations. These vaccines may be administered at any time before, after, or simultaneously with an immune globulin-containing product without substantially decreasing the antibody response.
§The duration of interference of immune globulin preparations with the immune response to the measles component of the MMR, measles-rubella, and monovalent measles vaccine is dose-related.

TABLE 6. Suggested intervals between administration of immune globulin preparations for various indications and vaccines containing live measles virus*

Indication	Dose (including mg lgG/kg)	Suggested Interval Before Measles Vaccination
Tetanus (TIG)	250 units (10 mg IgG/kg) IM	3 months
Hepatitis A (IG)		
Contact prophylaxis	0.02 mL/kg (3.3 mg IgG/kg) IM	3 months
International travel	0.06 mL/kg (10 mg IgG/kg) IM	3 months
Hepatitis B prophylaxis (HBIG)	0.06 mL/kg (10 mg IgG/kg) IM	3 months
Rabies prophylaxis (HRIG)	20 IU/kg (22 mg IgG/kg) IM	4 months
Varicella prophylaxis (VZIG)	125 units/10kg (20-40 mg IgG/kg) IM (max. 625 units)	5 months
Measles prophylaxis (IG)		
Normal contact	0.25 mL/kg (40 mg IgG/kg) IM	5 months
Immunocompromised contact	0.50 mL/kg (80 mg IgG/kg) IM	6 months
Blood transfusion		
Red blood cells (RBCs), washed	10 mL/kg (negligible IgG/kg) IV	None
RBCs, adenine-saline added	10 mL/kg (10 mg IgG/kg) IV	3 months
Packed RBCs (Hct 65%)†	10 mL/kg (60 mg IgG/kg) IV	6 months
Whole blood (Hct 35-50%)†	10 mL/kg (80-100 mg IgG/kg) IV	6 months
Plasma/platelet products	10 mL/kg (160 mg IgG/kg) IV	7 months
Replacement of humoral Immune deficiencies	300-400 mg/kg IV§ (as IGIV)	8 months
Treatment of:		
ITP¶	400 mg/kg IV (as IGIV)	8 months
ITP¶	1000 mg/kg IV (as IGIV)	10 months
Kawasaki disease	2 grams/kg IV (as IGIV)	11 months

* This table is not intended for determining the correct indications and dosage for the use of immune globulin preparations. Unvaccinated persons may not be fully protected against measles during the entire suggested interval and additional doses of immune globulin and/or measles vaccine may be indicated following measles exposure. The concentration of measles antibody in a particular immune globulin preparation can vary by lot. The rate of antibody clearance following receipt of an immune globulin preparation can also vary. The recommended intervals are extrapolated from an estimated half-life of 30 days for passively acquired antibody and an observed interference with the immune response to measles vaccine for 5 months following a dose of 80 mg IgG/kg.

† Assumes a serum IgG concentration of 16 mg/mL.

§ Measles vaccination is recommended for children with HIV infection but is contraindicated in patients with congenital disorders of the immune system.

¶ Immune (formerly, idiopathic) thrombocytopenic purpura.

TABLE 7. Guide to contraindications and precautions for vaccinations*

True contraindications and precautions	Not contraindications (vaccines may be administered)
General for all vaccines (DTaP, EIPV, MMR, Hib, Hepatitis B, Varicella, Pneumococcol Conjugate)	
Contraindications Anaphylactic reaction to a vaccine contraindicates further doses of that vaccine Anaphylactic reaction to a vaccine constituent contraindicates the use of vaccines containing that substance Moderate or severe illnesses with or without a fever	**Not contraindications** Mild to moderate local reaction (soreness, redness, swelling) following a dose of an injectable antigen Mild acute illness with or without low-grade fever Current antimicrobial therapy Convalescent phase of illnesses Prematurity (same dosage and indications as for normal, full-term infants) Recent exposure to an infectious disease History of penicillin or other nonspecific allergies or family history of such allergies
DTaP	
Contraindications Encephalopathy within 7 days of administration of previous dose of DTaP **Precautions^** Fever of ≥40.5°C (105°F) within 48 hours after vaccination with a prior dose of DTaP Collapse or shocklike state (hypotonic-hyporesponsive episode) within 48 hours of receiving a prior dose of DTaP Seizures within 3 days of receiving a prior dose of DTaP§ Persistent, inconsolable crying lasting ≥3 hours within 48 hours of receiving a prior dose of DTaP	**Not contraindications** Temperature of <40.5°C (105°F) following a previous dose of DTaP Family history of convulsions§ Family history of sudden infant death syndrome Family history of an adverse event following DTaP administration
EIPV	
Contraindication Anaphylactic reaction to neomycin or streptomycin **Precaution^** Pregnancy	
MMR¶	
Contraindications Anaphylactic reaction to gelatin ingestion and to neomycin Pregnancy Known altered immunodeficiency (hematologic and solid tumors; congenital immunodeficiency; and long-term immunosuppressive therapy)	**Not contraindications** Tuberculosis or positive PPD skin test Simultaneous TB skin testing^^ Breast-feeding Pregnancy of mother of recipient

TABLE 7. Guide to contraindications and precautions for vaccinations*—Continued

True contraindications and precautions	Not contraindications (vaccines may be administered)
MMR¶–Continued	
Precaution^ Recent immune globulin administration (see Table 8)	Immunodeficient family member or household contact Infection with HIV (except those who are severely immunocompromised) Non-anaphylactic reactions to gelatin or neomycin
Hib	
Contraindication None identified	**Not a contraindication** History of Hib disease
Hepatitis B	
Contraindication Anaphylactic reaction to common baker's yeast	**Not a contraindication** Pregnancy
Varicella	
Contraindication Anaphylactic reaction to neomycin Immunosuppression Receipt of antibody containing blood product Moderate to severe illness (child appears ill) **Precaution^** Pregnancy	
Pneumococcol Conjugate	
Contraindication Allergy to one of the vaccine components including diphtheria toxoid **Precaution^** Acute, moderate, or severe illness with or without fever	

TABLE 7. Guide to contraindications and precautions for vaccinations*—Continued

*This information is based on the recommendations of the Advisory Committee on Immunization Practices (ACIP) and those of the Committee on Infectious Diseases (Red Book Committee) of the American Academy of Pediatrics (AAP). Sometimes these recommendations vary from those contained in the manufacturer's package inserts. For more detailed information, providers should consult the published recommendations of the ACIP, AAP, and the manufacturer's package inserts.

^The events or conditions listed as precautions, although not contraindications, should be carefully reviewed. The benefits and risks of administering a specific vaccine to an individual under the circumstances should be considered. If the risks are believed to outweigh the benefits, the vaccination should be withheld; if the benefits are believed to outweigh the risks (for example, during an outbreak or foreign travel), the vaccination should be administered. Whether and when to administer DTP/DTaP to children with proven or suspected underlying neurologic disorders should be decided on an individual basis. It is prudent on theoretical grounds to avoid vaccinating pregnant women. However, if immediate protection against poliomyelitis is needed, OPV is preferred, although IPV may be considered if full vaccination can be completed before the anticipated imminent exposure.

§Acetaminophen given before administering DTP/DTaP and thereafter every 4 hours for 24 hours should be considered for children with a personal or family history of convulsions in siblings or parents.

¶No data exist to substantiate the theoretical risk of a suboptimal immune response from the administration of OPV and MMR within 30 days of each other.

^^Measles vaccination may temporarily suppress tuberculin reactivity. If testing can not be done the day of MMR vaccination, the test should be postponed for 4-6 weeks.

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TABLE 8. Minimum age for initial vaccination and minimum interval between vaccine doses by type of vaccine.

Vaccine	Minimum **age** for 1st dose*	Minimum **interval** from dose 1 to 2*	Minimum **interval** from dose 2 to 3*	Minimum **interval** from dose 3 to 4*
DTaP (DT)†	6 weeks	4 weeks	4 weeks	6 months
Combined DTaP-HIB	6 weeks	1 month	1 month	6 months
Hib (primary series)				
HbOC	6 weeks	1 month	1 month	§
PRP-T	6 weeks	1 month	1 month	§
PRP-OMP	6 weeks	1 month	§	
Polio¶	6 weeks	4 weeks	4 weeks**	††
MMR	12 months§§	1 month		
Hepatitis B	birth	1 month	2 months¶¶	
Varicella	12 months	4 weeks		
Pneumococcol Conjugate	6 weeks	4 weeks	4 weeks	6 months after 3rd dose

* These minimum acceptable ages and intervals may not correspond with the *optimal* recommended ages and intervals for vaccination. See tables 3-5 in the ACIP's *General Recommendations on Immunization* and ACIP's "Recommended Childhood Immunization Schedule, United States, January - December 2002" for the current recommended routine and accelerated vaccination schedules.

† The total number of doses of diphtheria and tetanus toxoids should not exceed six each before the seventh birthday.

§ The booster dose of Hib vaccine which is recommended following the primary vaccination series should be administered no earlier than 12 months of age *and* at least 2 months after the previous dose of Hib vaccine (Tables 3 and 4 of ACIP's *General Recommendations on Immunization*.

¶ Sequential EIPV/OPV, all OPV, or all EIPV

** For unvaccinated adults at increased risk of exposure to poliovirus with <3 months but >2 months available before protection is needed, three doses of EIPV should be administered at least 1 month apart.

†† If the third dose is given after the fourth birthday, the fourth (booster) dose is not needed.

§§ Although the age for measles vaccination may be as young as 6 months in outbreak areas where cases are occurring in children <1 year of age, children initially vaccinated before the first birthday should be revaccinated at 12-15 months of age and an additional dose of vaccine should be administered at the time of school entry or according to local policy. Doses of MMR or other measles containing vaccines should be separated by at least 1 month.

¶¶ This final dose is recommended at least 4 months after the first dose and no earlier than 6 months of age.